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ABSTRACT

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Math Attitudes and Computer Attitudes Among College Students

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Paper presented at the annual meeting of the
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Abstract

This study investigated the relationships among mathematics attitudes and computer attitudes. Approximately 105 college students were administered a questionnaire which assessed three dimensions of computer attitudes (anxiety toward computers, confidence in working with computers, and liking to work with computers) and three dimensions of math attitudes (math anxiety, math liking, and stereotyping math as a male domain). Results indicated significant positive correlations between attitudes toward computers and attitudes toward math.

Math Attitudes and Computer Attitudes Among College Students

As our society increasingly becomes oriented toward technology, the emphasis on mathematics skills has increased and a new emphasis on computer skills have emerged. It has been suggested (Molnar, 1981) that in the future, ignorance of computers will result in functional illiteracy similar to that which results from ignorance of mathematics, reading and writing today. As the field of education is responding to the need to provide students with computer instruction, it has been observed that students are indicating a wide range of responses; some are very positive and some are very negative and anxious. Many of the courses in computers are offered through math departments or math-related departments, such as engineering. Computers are also being used as an alternative to or supplement to traditional modes of instruction in mathematics classes. Although the results relative to the effectiveness of computer-based instruction are not definitive, Kulik, Kulik and Cohen (1980) found that for the most part the computer has made a small but significant contribution to the effectiveness of college teaching. They indicated that computer-based instruction raised achievement scores by approximately 0.25 standard

deviation.

Student attitudes toward the computer have an effect on the efficacy of computer-based learning. Thus negative attitudes could impede student achievement. If the computer is going to be used in the mathematics classroom, these attitudes and anxieties need to be dealt with. In order to assist the student in overcoming their anxiety, an understanding of computer attitudes and their relationship to mathematics is needed.

Student attitudes toward the computer can be related to their attitudes toward the subject matter. Kulik, Kulik and Cohen (1980) found that computer-based instruction produced positive but small effects on the attitudes of students toward the subject matter. However, if the students are anxious about using the computer, this could increase their anxiety toward mathematics.

Student attitudes toward mathematics is a major concern for many educators. One of the attitudinal dimensions is math anxiety. Studies (Betz, 1978; Fennema & Sherman, 1977; Richardson & Suinn, 1972) have established that math anxiety is prevalent among high school and college students. In general, it has an inhibiting rather than facilitating influence on the learner. It has been shown in the literature (Futuro & Lang, 1982; Betz, 1978; Buckely & Ribordy, 1982;

Clute, 1984) that there is a positive correlation between student attitudes and student achievement. Generally, anxiety and achievement are inversely related.

Some studies tend to confirm a relationship between a liking for mathematics and math anxiety. Brush (1978) found that student scores on the Mathematics Anxiety Rating Scale (MARS) were correlated highly ($r=.39$) with measures of dislike and anxiety about mathematics. She also found that higher MARS scores were related to limited experiences with mathematics.

Other research studies (Betz, 1978; Brush, 1978) have demonstrated that levels of math anxiety are related to the number of mathematics courses taken in high school. Higher scores on the MARS accompanied more limited experience with mathematics.

Usually the number of courses taken by women is significantly less than the number taken by men. Studies (Betz, 1978; Boswell & Katz, 1980; Brush, 1978; Fennema & Sherman, 1978) have suggested that sex differences in mathematics and anxiety exist. Many socio-cultural factors contribute to the stereotypical belief that mathematics is a male domain. These attitudes can seriously affect the opportunities women have in math-related careers.

Some studies (Loyd & Gressard, 1984; Jones, 1983)

have indicated that this trend of sex differences for math anxiety, liking and confidence does not exist for computers. Jones did find that males perceive computers as a male domain more so than females.

Currently, there is a dearth of research on the relationship between computer anxiety and math anxiety. One study (Gressard & Loyd, 1984) did find a significant relationship between computer anxiety and math anxiety. Clearly, there is a need for more research on this issue.

It is the purpose of this study to examine the relationships among computer attitudes and among mathematics attitudes for college students.

METHOD

Subjects

The sample consisted of 105 undergraduate students at a comprehensive college in Virginia, who were enrolled in either a freshman level basic mathematics course or a linear algebra course. The students enrolled in the basic mathematics course were non-science majors. Their ages ranged from 17 to 30 with approximately 50% 22 years or younger. Eighty percent were undergraduate and the remaining 20% were graduate students. Forty-one percent were males and 59% females. Thirty percent of the students reported no experience working with computers and 20% had one year or more working with computers. Only 15% reported having a computer in their homes.

Procedure

Each student was administered a survey instrument containing six scales. Three scales measured math attitudes. These three scales each contained ten items and were modified versions of the Fennema-Sherman Math Attitudes Scales and measured anxiety toward mathematics, liking of mathematics, and stereotyping math as a male domain. Alpha reliabilities for these scales were .91, .89 and .83, respectively.

Students responded to each statement on a four point scale ranging from "strongly agree" to "strongly disagree." Both positively and negatively worded statements were presented and responses were also coded so that a higher score represented a more positive attitude towards using computers. Scores on each scale could range from ten to 40.

Means and standard deviations were computed. Pearson product moment correlations were computed among the six scale scores for each measure.

RESULTS

The means and standard deviations for each of the three math attitude scales and each of the three computer attitude scales are presented in Table 1. A score of 25 on each scale would indicate a neutral attitude. For the Math Anxiety and Math Liking scores, the averages are just slightly positive with values of 26.4 and 28.5 respectively. The mean of the math attitude score measuring perception of math as a male domain indicates that the sample does not perceive mathematics as a male domain. The means of the three attitude scales, 33.3, 33.2, and 32.6 indicate that the sample indicated positive responses to lack of computer anxiety, computer confidence and computer liking, respectively.

Insert Table 1 about here.

Correlations among the six attitude scales are presented in Table 2. All correlations were statistically significant at the .05 level of significance.

The correlations indicate that a significant positive relationship exists between each pair of scales. The correlation between Math Anxiety and Math Liking (.63) indicates a high positive relationship between lack of anxiety and enjoying math. The correlations between math as a male domain and each of the other two math attitudes, math anxiety and math liking, were positive but relatively low (.18 and .31 respectively). These correlations suggest that although the attitudes are statistically related, they are still measuring quite distinct attitudes.

The correlations among the three computer attitude scales range from .82 to .88. These high positive correlations suggest that the three scales are highly interrelated and are measuring very similar constructs.

The correlations between math attitude scores and computer attitude scores ranged from .31 to .45 indicating low to moderate positive relationships between math

attitudes and computer attitudes. Although these are significant relationships, the correlations suggest that attitudes about math and attitudes about computers are somewhat distinct as measured by these scales.

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Table 1

Means and Standard Deviations of Math Attitudes and Computer Attitudes

Scale	Mean	Standard Deviation
Math Anxiety	26.4	4.6
Math Liking	28.5	4.8
Math as Male Domain	34.7	4.5
Computer Anxiety	33.3	5.6
Computer Confidence	33.2	5.5
Computer Liking	32.6	5.3

Table 2

Correlations Among Math Attitudes

and Computer Attitudes

	(2)	(3)	(4)	(5)	(6)
Math Anxiety (1)	.63	.18	.39	.37	.31
Math Liking (2)		.31	.38	.38	.45
Math as Male Domain (3)			.35	.38	.32
Computer Anxiety (4)				.88	.82
Computer Confidence (5)					.83
Computer Liking (6)					